tried to look at a few sections from the point of view of personal knowledge, and others from that of ignorance; for in the one case I might test the information, in the other regard the book as a learner. For the former purpose I have read in a carping spirit. Not that I hold it right to do this with a really good book. Horace lays down the true rule, "Ubi plura nitent in carmine non ego paucis offendar maculis"; but I did it, and now give the results to show that the book will stand a test which is almost unjust. A short glossary of rock names and some other geological terms would be a useful addition for the sake of the unlearned. In the course of my reading I have found one misprint, "Apls" for Alps, which is very likely due to that familiar of the printer who should be out of place in a chapel. Editors are not always responsible for press errors. However, here they must be few indeed. In mentioning Suess' idea that sometimes it is rather the ocean which has sunk than the land which has risen, a writer says that the 100-foot beach-line in Western Scotland

"maintains its level, lying on rocks of different ages and hardness, and crosses undisturbed great faults and dislocations."

But if the antiquity of the faults, as is the case here, is much greater than that of the beaches, the last reason is not conclusive, for the mass might be so far welded together as to move as a whole But is the fact itself certain? If it be so, it does away with an objection commonly urged against the marine origin of the parallel roads of Glenroy. At any rate it should have been added that in Norway, not to mention other parts of the northern hemisphere, a beach level often varies in height. Perhaps, also, a little too much prominence is given to the theory of the earth's tetrahedral figure, for it is still on its trial, and apparently fails, as the author admits, to explain every fact. On p. 57 boulder clay is said to be an accumulation left by ice-sheets or in extra-glacial lakes. As not a few persons who have carefully studied the subject maintain that some boulder clay has been deposited in the sea, and have added proofs which have been met only by hypotheses, that view also should have been mentioned as a third possibility. In another aspect of ice-work, one author (p. 258) boldly abandons glacial excavation to account for the origin of the Alpine lakes, and attributes them, rightly as I believe, to crust movements; yet we are told on p. 272 that the lakes of the Alpine foreland are clearly related to the great ice-sheet which once overspread it. We presume this signifies glacial excavation; but, if so, what about the "hinter land"? Again, has it yet been *proved* (see p. 269) that the Scandinavian ice-sheet extended over northern Germany? It is, no doubt, an article of faith with a large school; but as difficulties suggest themselves to a sceptical mind after examining the ground, a less positive statement would have been better. As regards the Alps, it is not a happy phrase to speak of the Finster Aarhorn, Jungfrau, Möneh, Wetterhorn, &c., as

"grouped in one compact mass of snows and rugged peaks *round* the valleys of Lautebrunnen and Grindelwald";

for nothing can be more striking than the apparent ending, of those valleys at the foot of that great mountain wall. We find no mention of the Viso among the Italian Alps, yet no peak is more conspicuous than it from the Piedmontese plain; and the fact that the south-eastern Alps near the Austro-Italian frontier—so remarkable in their scenery—are magnesian limestone is not clearly stated.

The Pelvoux (p. 237) is not over 13,000 feet high, for only two peaks in the Dauphine group, the Ecrins and the Meije, exceed that elevation. To say that "since historic times not the slightest eruption has taken place in Auvergne" assumes a controverted point. In Italy the remarkable group of the Carrara mountains is not distinguished so clearly as it should be from the rest of the Appennines, and to say that Pozzuoli "stands in the midst of vast ruins of the Roman period" is not quite the most accurate of phrases.

Enough however of such criticisms, for they are so trivial as to be hardly worth mention. We only write them down to show how difficult, even if one tries to carp, it is to find any fault. When we come to excellencies their name is legion. With seventy contributors, all of whom have done their work well, it is almost invidious to select, but we may mention Prof. De Lapparent's article on the physical geography of France as no less lucid in statement than powerful in grasp, and those on Natal, the Transvaal and the Orange Free State, by the Right Hon. J. Bryce (which we naturally selected to look at from the standpoint of general ignorance), as singularly clear and informing. The book must have cost Dr. Mill no little toil as editor. Organisation and correspondence in a work like this must have been heavy tasks; and besides these he has himself contributed some excellent articles, and translated wholly or partially those of seventeen contributors. We heartily congratulate him on the final result. He deserves our gratitude for giving us a geography which is at once good in literary form and invaluable for reference, far in advance of any similar work which has been produced in this country. No teacher, indeed no advanced student, can afford to be without it; more than this, it must be on the shelves of every important library, and will be of the greatest use to literary as well as to scientific men, indeed to all who read for the love of culture. T. G. BONNEY.

## CHEMISTRY FOR THE PEOPLE.

*Einführung in die Chimie in leichtfasslicher Form.* Von Prof. Dr. Lassar-Cohn. Pp. xi + 299. (Hamburg and Liepzig: Leopold Voss, 1899.)

THIS book begins with an interesting *apologia*. When the author first took up the work of teaching in Volkshochschulen he lectured to the pupils very much in the same way that he himself had been lectured to in the University during his first semester. He soon came to think, however, that this was a mistake, and that a class of people, meeting in the evening hours for the improvement of their general knowledge, should not be treated like students taking up a professional study. He therefore altered the form of his lectures, and endeavoured to present a more general and expansive view of chemistry, and to impart, as it were, the

spirit and stimulus of the science. In like manner he came to the conclusion that ordinary chemical text-books are unsuitable for the pupils of Volkshochschulen, and the present work has been written to fill the void. The case which Prof. Lassar-Cohn endeavours to meet is a somewhat special one. Given an evening class of young men desirous of improving their general education, which is the best way of giving them some notion of chemistry? Prof. Lassar-Cohn answers this question by saying that as a laboratory is a luxury which a Volkshochschule cannot afford, you must content yourself with experimental lectures and present the subject in its broadest and most interesting aspect.

Here again, it would seem, the prejudice of University training makes itself felt, in the notion that a laboratory suitable for teaching the elements of chemistry is necessarily the large and expensively furnished apartment set apart in universities for the professional study of chemistry. This is indeed a common enough belief, one that has led in this country to great extravagance and much futile teaching. It is impossible to believe that Germany would make difficulties about providing the Volkshochschulen with all that is really requisite for teaching, by practical work, the amount of elementary physics and chemistry which should be there attempted. Until this is done, until a properly coordinated course of work in the laboratory and class-room can be arranged, really profitable *teaching* will, in the opinion of the present writer, be impossible.

Whether or not we accept the author's standpoint that lectures are inevitable, we must admit they may be made to open out new vistas of knowledge and supply a stimulus to study, and we cannot hesitate to praise the book before us. Dr. Lassar-Cohn possesses in a high degree the faculty of exposition; he writes in a style which, for force, clearness, and above all, freedom from prolixity, is uncommon enough in German text-books. The matter of the book, too, fully corresponds with the author's intention. It is comprehensive without being encyclopædic, and is supplied with a good deal of human interest. The historical element is not introduced to any great extent, not as much, in fact, as it might well be in such a book. Hardly a great name in the roll of chemists is mentioned, except that of Kekulé. The book begins much in the orthodox way, with an attempt to delimit the frontier between chemistry and physics, and quickly and discreetly passes on to water and hydrogen. After this come the halogens and the hydracids, followed by lucid explanation of the laws of chemical combination and the atomic and molecular theories. The other chief non-metals and their compounds are passed in review, and then half a dozen of the metals are dealt with. Here and there chapters appear dealing with special topics, such as the building up of plants from inorganic substances, the preparation of metals by electrolysis, the classification of the elements. The treatment of these topics is excellent. The author has a lightness of touch which is very agreeable, and very different from the heavy hand of the compiler. This is particularly evident in the treatment of organic chemistry, which is admirably reviewed in some forty pages, and throughout the work there is indeed a pleasant sense of freshness. To those who wish to gain a general idea of the scope of modern chemistry, and who cannot obtain class instruction, this book may be strongly recommended. It has not the popular interest of the author's "Chemistry in Daily Life"; but it has a different object, the aim being to show the philosophy rather than the practical usefulness of the science. It is probable that there is a considerable public to whom the book will be a really valuable acquisition, and with whom it will fulfil its aim of being an introduction to chemistry "in leichtfasslicher Form."

The illustrations, which are fairly numerous, call for a word of criticism. They are exceedingly crude, over-shaded, and often purposeless. The first figure in the book, for example, is an ill-drawn dinner-bell, which is to illustrate the statement that a bell when sounded remains unchanged in substance, and that therefore the science of sound belongs to physics!

In a brief postscript Dr. Lassar-Cohn enters a vigorous protest against the recent decision of the German Chemical Society to tabulate the atomic weights on the basis of O=16. He maintains that, to the beginner, it will be quite unintelligible why the lightest atom should have a weight of 1·01—chemical teaching, in fact, will sink back to a half-alchemistic stage if the system of atomic weights, which lies at the foundation of the whole science, is to be a matter for belief rather than for logical reasoning. There seems to be some exaggeration here. Whatever may be said in favour of oxygen being taken as 16 or 15·88, it is surely not a very difficult matter to explain, even to beginners, the practical reasons why *for the time being* 16 has been selected. It may indeed be an advantage if pupils are thereby forced to realise a little more fully than has been usual how atomic weights actually are determined. It must be admitted, however, that the question of O=16 *versus* H=1 is well worth consideration from the point of view of the chemical teacher.

A. S.

## OUR BOOK SHELF.

*Laboratory Manual. Experiments to illustrate the Principles of Chemistry.* By H. W. Hillyer, Ph.D. Pp. 200. (New York: The Macmillan Company. London: Macmillan and Co., Ltd.)

THIS book is intended as an introduction to chemistry for college students, and is written on the newer (or, as we have heard it termed, the new-fangled) plan. In other words, the student is asked to record what he finds in his experiments, and not told what he should find. The success of this newer method, as of the older one, must depend on much besides the text-book; but if it be assumed that the student is anxious to learn and willing to take trouble, there can be little doubt where the advantage lies.

In addressing the student, the author remarks that "the mere bringing of chemical substances into conditions under which they will react has less utility as a means of culture than most of the manual occupations"—a just if a somewhat "superior" observation—and he proceeds to give general directions which, if only observed, will leave nothing to be desired in the student's attitude of mind. Experience shows, alas! how very difficult it is to get these injunctions observed.

To illustrate the author's method, the following may be